FLUKE®

Instruction Manual

Model

Y5000

Interface, 5100 Series

P/N 492017 November 1978
REV. 2 2/80

WARRANTY

Notwithstanding any provision of any agreement the following warranty is exclusive:

The JOHN FLUKE MFG. CO., INC., warrants each instrument it manufactures to be free from defects in material and workmanship under normal use and service for the period of 1-year from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses, disposable batteries (rechargeable type batteries are warranted for 90-days), or any product or parts which have been subject to misuse, neglect, accident or abnormal conditions of operations.

In the event of failure of a product covered by this warranty, John Fluke Mfg. Co., Inc., will repair and calibrate an instrument returned to an authorized Service Facility within 1 year of the original purchase; provided the warrantor's examination discloses to its satisfaction that the product was defective. The warrantor may, at its option, replace the product in lieu of repair. With regard to any instrument returned within one year of the original purchase, said repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident or abnormal conditions of operations, repairs will be billed at a nominal cost. In such case, an estimate will be submitted before work is started, if requested.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. JOHN FLUKE MFG. CO., INC., SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT OR OTHERWISE.

If any failure occurs, the following steps should be taken:

1. Notify the JOHN FLUKE MFG. CO., INC., or the nearest Service facility, giving full details of the difficulty, and include the Model number, type number, and serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument, transportation prepaid. Repairs will be made at the Service Facility and the instrument returned, transportation prepaid.

SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT

All shipments of JOHN FLUKE MFG. CO., INC., instruments should be made via United Parcel Service or "Best Way" prepaid. The instrument should be shipped in the original packing carton; or if it is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL PURCHASER

The instrument should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument is damaged in any way, a claim should be filed with the carrier immediately. (To obtain a quotation to repair shipment damage, contact the nearest Fluke Technical Center.) Final claim and negotiations with the carrier must be completed by the customer.

The JOHN FLUKE MFG. CO., INC. will be happy to answer all application or use questions, which will enhance your use of this instrument. Please address your requests or correspondence to: JOHN FLUKE MFG. CO., INC., P.O. BOX 43210, MOUNTLAKE TERRACE, WASHINGTON 98043, ATTEN: Sales Dept. For European Customers: Fluke (Nederland) B.V., Zevenheuvelenweg 53, Tilburg, The Netherlands.

* For European customers, Air Freight prepaid.

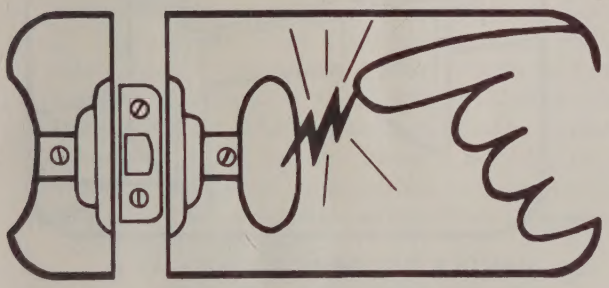
John Fluke Mfg. Co., Inc., • P.O. Box 43210 • Mountlake Terrace, Washington 98043

Rev. 9/78

static awareness

A Message From

John Fluke Mfg. Co., Inc.

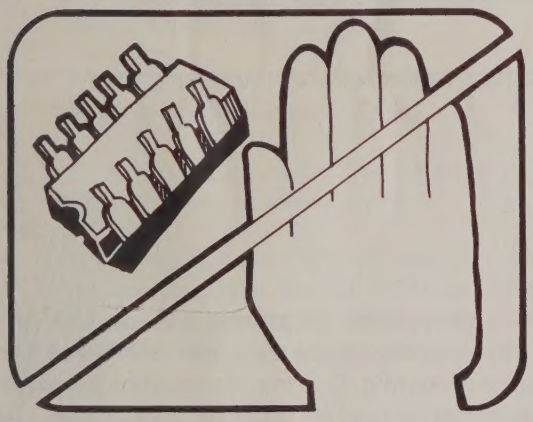


Some semiconductors and custom IC's can be damaged by electrostatic discharge during handling. This notice explains how you can minimize the chances of destroying such devices by:

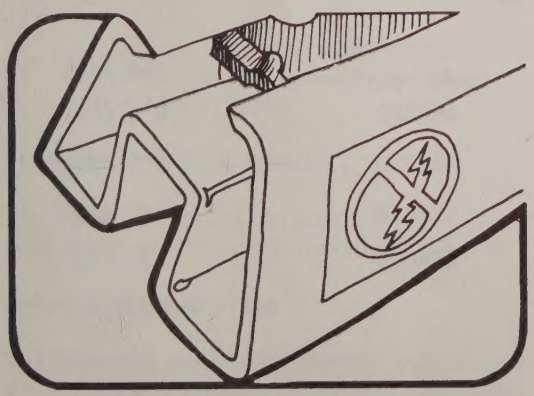
1. Knowing that there is a problem.
2. Learning the guidelines for handling them.
3. Using the procedures, and packaging and bench techniques that are recommended.

The Static Sensitive (S.S.) devices are identified in the Fluke technical manual parts list with the symbol "⊗".

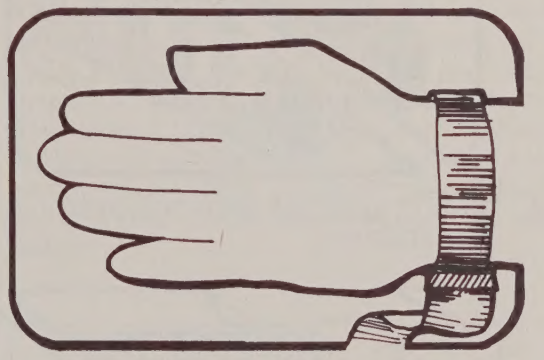
The following practices should be followed to minimize damage to S.S. devices.



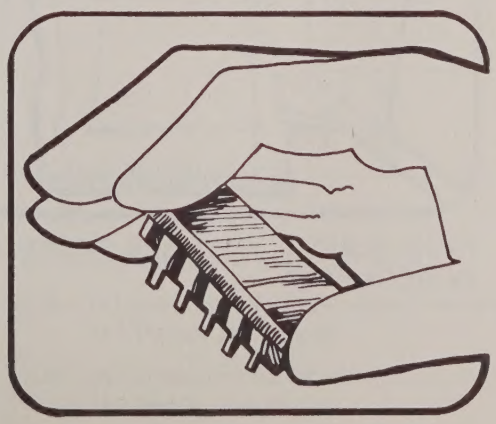
1. MINIMIZE HANDLING



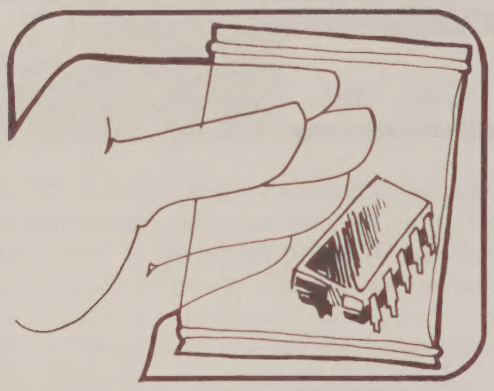
2. KEEP PARTS IN ORIGINAL CONTAINERS UNTIL READY FOR USE.



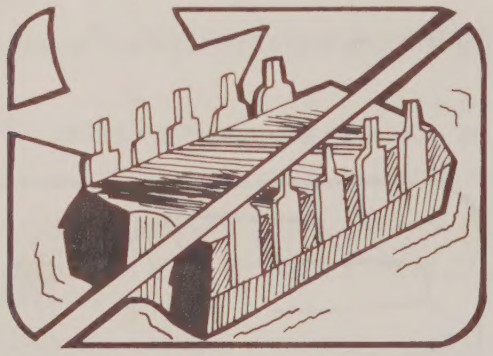
3. DISCHARGE PERSONAL STATIC BEFORE HANDLING DEVICES



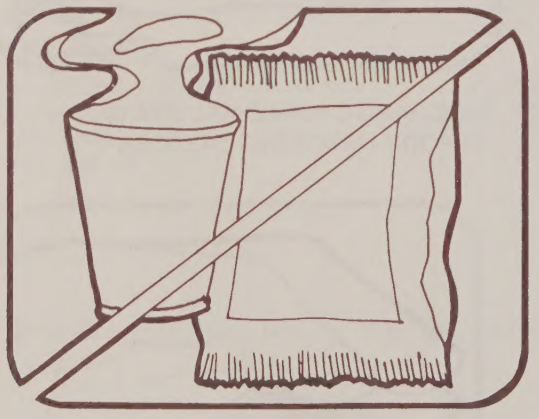
4. HANDLE S.S. DEVICES BY THE BODY



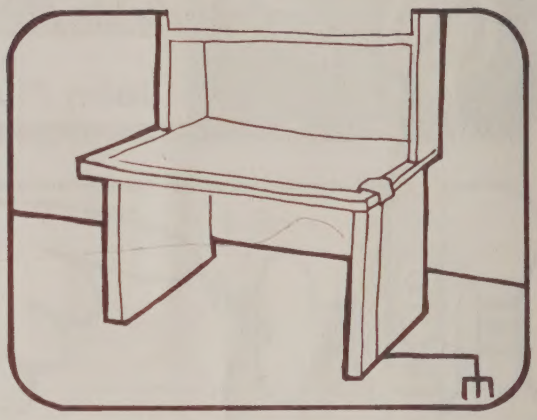
5. USE ANTI-STATIC CONTAINERS FOR HANDLING AND TRANSPORT



6. DO NOT SLIDE S.S. DEVICES OVER ANY SURFACE



7. AVOID PLASTIC, VINYL AND STYROFOAM IN WORK AREA



8. HANDLE S.S. DEVICES ONLY AT A STATIC-FREE WORK STATION

9. ONLY ANTI-STATIC TYPE SOLDER-SUCKERS SHOULD BE USED.

10. ONLY GROUNDED TIP SOLDERING IRONS SHOULD BE USED.

Anti-static bags, for storing S.S. devices or pcbs with these devices on them, can be ordered from the John Fluke Mfg. Co., Inc.. See section 5 in any Fluke technical manual for ordering instructions. Use the following part numbers when ordering these special bags.

John Fluke Part No.	Bag Size
453522	6" x 8"
453530	8" x 12"
453548	16" x 24"
454025	12" x 15"

INTRODUCTION

The Model Y5000 is a 5100 Series (5100A, 5101A, 5102A) accessory designed to enable the Model 5205A Power Amplifier, 5220A Current Amplifier, and other similar instruments to operate as extensions of a 5100 Series calibrator. Physically, the Y5000 is a unit that connects to the rear of the 5100 Series. I/O connectors on the unit accommodate interface cables that complete the interface connections necessary for both digital and analog control of the extension units. Currently available interface cables include the Model Y5001 (Y5000 to 5205A Interface Cable) and the Model Y5002 (Y5000 to 5220A Interface Cable). When required, these cables should be ordered by model number. Room is available on the Y5000 for adding two more interface ports (for a total of four). The electrical portion of the Y5000 is capable of supporting all four ports.

INSTALLATION

The Y5000 Interface plugs onto the rear panel of the 5100 Series calibrator as shown in Figure 1. Use the following procedure to install the interface.

1. Disconnect the 5100 Series calibrator and the 5205A/5220A from line power.

2. Position and connect the Y5000 at the rear of the 5100 Series as shown in Figure 1.

3. Secure the position of the Y5000 by installing the two mounting screws provided.

4. Using the appropriate interface cable(s), connect the 5205A and/or 5220A to the Y5000. Either unit may be connected to either pair of Y5000 connectors.

NOTE

Use the Y5001 cable with the 5205A. Use the Y5002 cable with the 5220A.

5. Secure the cable connections using the connector clamps provided on the rear of the Y5000/5205A/5220A.

OPERATING FEATURES

The Y5000 and its connectors are shown in Figure 2. A brief description of each connector is included.

OPERATING NOTES

The following paragraphs describe various conditions which should be considered before operating the 5205A or 5220A by way of a 5100 Series calibrator and the Y5000 Interface.

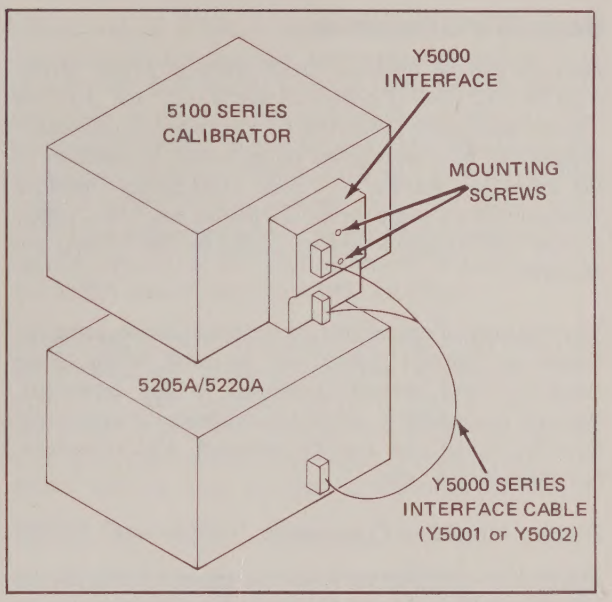
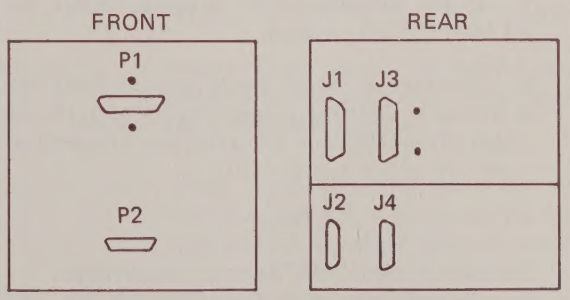


Figure 1. Installation Details

5100 Series/Y5000 Compatibility

The Y5000 Interface is compatible with all 5100 Series calibrators equipped with software versions 1.0.5 and above. To identify the software used in your calibrator, observe the display while switching power from off to on. The software version will be temporarily displayed. Calibrators displaying software versions of 1.0.4 will not operate with the Y5000. Contact your nearest John Fluke Service Center if your instrument requires a software update.



P1 = Digital I/O data to/from 5100 Series

P2 = Analog I/O data to/from 5100 Series

J1/J2 = I/O connections for first external instrument;
J1 = Digital, J2 = Analog

J3/J4 = I/O connections for second external instrument;
J3 = Digital, J4 = Analog

Figure 2. Y5000 Connections

Boost Mode Operation

Outputs can be obtained from either a Fluke Model 5205A/5215A Power Amplifier or 5220A Transconductance Amplifier to augment the calibrator capabilities by selecting the boost mode. In addition to the amplifiers named, a Y5000 5100 Series Interface Accessory and a cable for the applicable amplifier (Y5001 for the 5205A/5215A and/or Y5002 for the 5220A) are required.

The sequence of operations for the boost mode, using the Power or Current Amplifiers, is listed below. Both amplifiers may remain connected to the calibrator, through the interface, while the calibrator is operating, however, only one can be selected, and therefore, operational at a time.

Power Amplifier Operation

The Power Amplifier used may be either a Fluke Model 5205A or a Fluke Model 5215A. Either amplifier may be used to obtain ac voltage output, however, dc output can be obtained only from the Model 5220A.

Obtain a boost mode power amplifier output using the following procedure:

1. Insure power has been removed from both the calibrator and amplifier.

2. Connect the Y5000 Interface to the calibrator.

3. Connect the amplifier to the calibrator interface using the Y5001 Cable Assembly.

4. Apply power to both instruments and allow an adequate warmup period.

5. If the Model 5205A is used, select the REMOTE/5200 position.

6. Program, a boost mode output from the calibrator by selecting, in turn, Boost, Output Value Data (100 to 1100 volts, and a frequency from 50 Hz to 50 kHz if ac), and ENTER.

NOTE

Selection of the BOOST keyswitch may either precede or follow entry of the Output Value Data without affecting operations, provided it precedes the selection of ENTER.

7. The BOOST indicator illuminates when the BOOST keyswitch is depressed, the voltage selected appears on the calibrator output display, and the frequency, if applicable, appears on the central display when the ENTER keyswitch is depressed. If a Model 5205A is used, the 5200 indicator on the amplifier illuminates.

NOTE

If both 5205A/5215A and 5220A are connected through the Y5000, the 5220A goes into REMOTE, STANDBY, and LOCAL LOCKOUT when ENTER is selected. This prevents accidental operation of the 5220A from the power amplifier drive signal on the 5205A/5215A rear panel.

8. Select OPR (operate) on the calibrator.

NOTE

When operating the ac mode, the ac drive signal (up to 20V ac) for the boost amplifier is present on the calibrator output terminals.

9. The OPERATE indicators of both the calibrator and amplifier illuminate and the programmed output value is available at the amplifier output terminals.

NOTE

Depressing the BOOST, ENTER, while in the boost mode, will toggle the calibrator out of the boost mode, and return the output to the calibrator, however, at the greatly reduced power specifications of the basic instrument.

Transconductance Amplifier Operation

The Fluke Model 5220A Transconductance (current) Amplifier is used to expand the capabilities of the calibrator up to 20 (19.9999) Amps. When connected to a 5100 Series B Calibrator through a Y5000 Interface and Y5002 Cable Assembly, outputs can be programmed directly from the calibrator front panel.

Obtain a boost mode current amplifier output using the following procedure:

1. Insure that power has been removed from both the calibrator and amplifier.

2. Connect the Y5000 Interface to the calibrator.

3. Connect the amplifier to the calibrator interface using the Y5002 Cable Assembly.

4. Connect a load or current meter to the 5220A outputs.

NOTE

The current selected multiplied by the load resistance must equal less than 3V rms or 4.2V dc to prevent compliance trip of the equipment.

5. Apply power to both instruments and allow an adequate warmup period.

6. Program a boost mode output from the calibrator by selecting, in turn, BOOST, Output Value Data (from a 0A dc or 2A ac to a maximum of 19.9999 Amps), and ENTER.

NOTE

Selection of the BOOST keyswitch may either precede or follow entry of the Output Value Data without affecting operation, provided it precedes the selection of ENTER.

7. The BOOST indicator illuminates when the BOOST keyswitch is depressed, and the current selected appears on the calibrator output display, and the frequency, if applicable, appears on the central display, when the ENTER keyswitch is depressed. The REMOTE and REAR INPUT indicators illuminate on the current amplifier front panel when the calibrator ENTER keyswitch is depressed.

8. Select OPR (operate) on the calibrator.

NOTE

When operating in the ac mode, the ac drive signal (up to 20V ac) for the boost amplifier is also present on the calibrator output terminals.

9. The OPERATE indicators of both the calibrator and amplifier illuminate and the programmed output value is available at the amplifier output terminals.

NOTE

Depressing BOOST, ENTER while in the boost mode, will toggle the calibrator out of the boost mode and return the output to the calibrator terminals; however, if an output greater than the capability of the calibrator, i.e., >1.99999A, has been programmed, an error results, and an error message is displayed.

OPERATION

Once installed the Y5000 does not require attention by the operator. Its functions are all directly controlled by way of the 5100 Series calibrator. These are described earlier under Operating Notes.

THEORY OF OPERATION

The Y5000, connects to the rear panel of a 5100 Series calibrator to provide the interface necessary to control a 5205A and/or 5220A as extensions of the 5100 Series. Functionally, the interface operates as a multiple I/O port for the 5100 Series Internal Digital (MIS) Bus, as described in the 5100 Series Instruction Manual. The ports are connected in parallel and either may be used to interface a 5205A or 5220A if the appropriate interface cable is used. Address, control, and status logic for the 5205A are contained within the interface. Similar address logic is required for the 5220A. However, it is contained in the 5220A rather than the Y5000 Interface.

The Y5000, as shown in Figure 3, is most easily described by dividing its operation into two sequences, 5205A operation and external module operation. Both sequences employ the Address Bus, Data Bus, Analog I/O Bus, and acknowledge logic. However, only the 5205A uses the reset, address, control, and status logic.

5205A Operation

When the 5100 Series calibrator is energized the Y5000 is supplied with +5V dc operating power. Until the +15V dc has reached an acceptable operating level, the power-on-reset circuit maintains a momentary low or reset input to the 5205A address decoder and control data latch. This initializes the 5205A portion of the Y5000, thereby forcing the 5205A (by way of the Operate and Control commands) to the local and standby modes.

The indirect address (IC0 and IC1 high) is recognized by the 5205A address decoder only after the direct address has been received. Once recognized, it causes the address decoder to issue a read status command. This, in turn, enables the 5205A status gates to place Sense, Trip, and Status data from the 5205A onto the Data Bus where it is read by the 5100 Series. A functional description of the 5205A control, operate, and status lines follows:

Control-	When low, Control causes the REMOTE LED on the 5205A to light.
Operate-	When low, Operate lights the OPERATE display on the 5205A if all other conditions permit.
Sense-	When high, Sense indicates that the 5205A is capable of dc operation, low indicates dc operation is not allowed.
Trip-	Trip indicates the presence of an overload or fault condition in the 5205A.
Status-	Status indicates the present operating mode of the 5205A, standby or operate.

Analog data necessary to control the amplitude of the 5205A output is provided by way of the Analog I/O Bus. When commanded to operate, the 5205A will output a voltage 100 times greater than that of the 5100 Series.

External Mode Operation

The interface of external modules by way of the Y5000 assumes that reset, address, control, and status functions are contained in the external module. The general sequence of events necessary to communicate with an external module (hereafter referred to as the unit) are as follows:

1. The 5100 Series issues a recognizable address to the unit by way of the Address Bus and the external module addressing buffers.

2. Upon recognizing the address, the unit commands the read or write (W/$\overline{R}$) mode. W/$\overline{R}$ high commands the Y5000 to present 5100 Series data present on the Data Bus to the unit. W/$\overline{R}$ low commands the Y5000 to receive 5100 Series control data from the unit.

3. The unit acknowledges the receipt of the address by generating an ACK to the 5100 Series by way of the external module acknowledge gates and driver.

4. If necessary, the unit can interrupt the 5100 Series by pulling the INT B line low. The 5100 Series acknowledges the interrupt by pulling the INA B line low.

MAINTENANCE

There are no routine maintenance and/or calibration adjustment requirements for the Y5000. To test the performance of the Y5000, complete the interface installation and make sure the units involved operate as described earlier under Operating Notes.

LIST OF REPLACEABLE PARTS

The lists of replaceable parts for the Y5000 are given in Tables 1 through 4. Refer to Section 5 of the 5100 Series Instruction Manual for ordering information.

CAUTION

Indicated devices are subject to damage by static discharge.

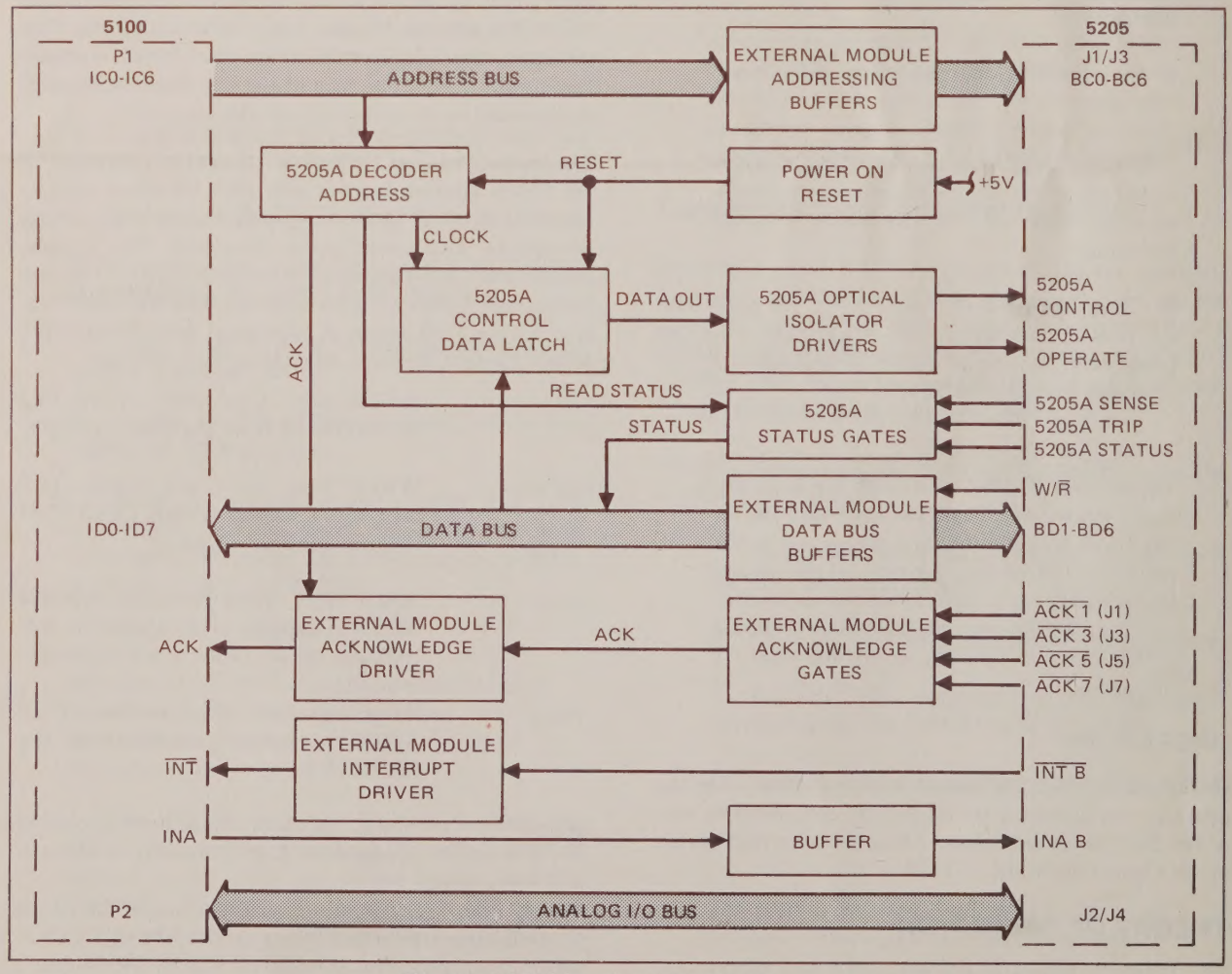


Figure 3. Y5000 Interface Block Diagram

Table 1. Y5000 Final Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
	FINAL ASSEMBLY, Y5000 FIGURE 4						
A1	Ⓧ LOGIC ASSY (Y5000-4001T)	491985	89536	491985	1		
A2	OUTPUT ASSY (Y5000-4002T)	491993	89536	491993	1		
A3	ANALOG BUS ASSY (Y5000-4003T)	492009	89536	492009	1		
H1	SCREW, FH, UNDERCUT 6-32 X 1/4	320093	89536	320093	15		
MP1	COVER, FRONT	479527	89536	479527	1		
MP2	COVER, REAR	479535	89536	479535	1		

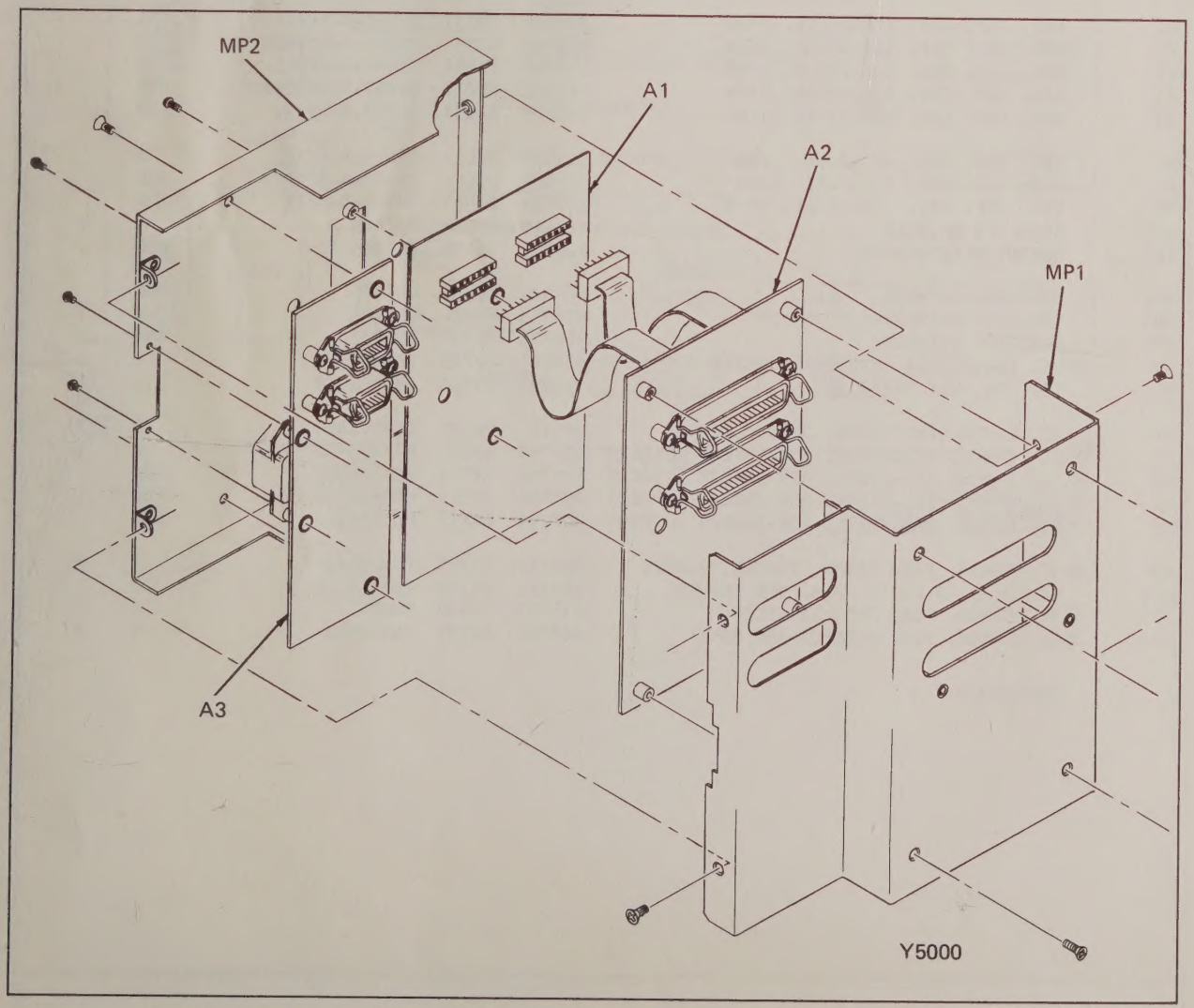
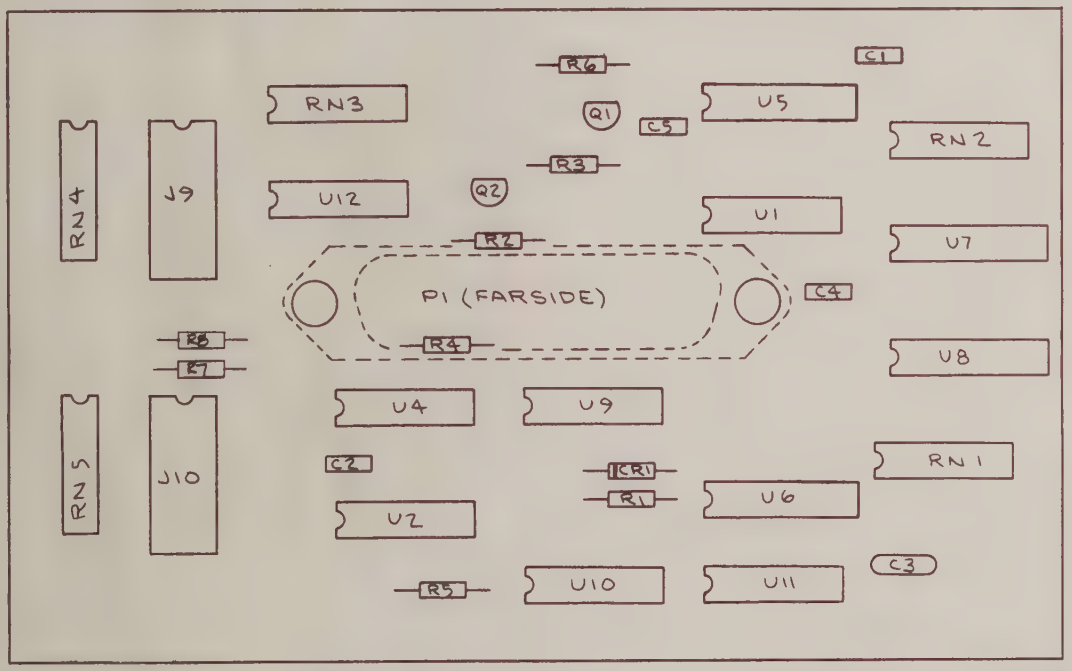


Figure 4. Y5000 Final Assembly

Table 2. A1 Logic PCB Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
A1	Ⓟ LOGIC ASSEMBLY FIGURE 5 (Y5000-4001T)	491985	89536	491985	REF		
C1	CAP, CER, 0.22 UF +/-20%, 50V	309849	71590	CW30C224K	4		
C2	CAP, CER, 0.22 UF +/-20%, 50V	309849	71590	CW30C224K	REF		
C3	CAP, MICA, 220 PF +/-5%, 500V	170423	72136	DMF15221J	1		
C4	CAP, CER, 0.22 UF +/-20%, 50V	309849	71590	CW30C224K	REF		
C5	CAP, CER, 0.22 UF +/-20%, 50V	309849	71590	CW30C224K	REF		
CR1	DIODE, SI, HI-SPEED SWITCH	203323	07910	1N4448	1	1	
H1	SCREW, PHP, 4-40 X 1/2	152132	73734	19026	2		
H2	SPACER, STANDOFF	335604	89536	335604	2		
J9	SOCKET, 16-PIN	387324	71785	133-59-02-062	2		
J10	SOCKET, 16-PIN	387324	71785	133-59-02-062	REF		
P1	CONNECTOR, PLUG 36-PIN	474254	02660	57-10360-13	1		
Q1	XSTR, SI, NPN	226290	89536	226290	1	1	
Q2	XSTR, SI, NPN	218396	89536	218396	1	1	
R1	RES, DEP. CAR, 47K +/-5%, 1/4W	348896	80031	CR251-4-5P47K	1		
R2	RES, DEP. CAR, 150 +/-5%, 1/4W	343442	80031	CR251-4-5P150E	2		
R3	RES, DEP. CAR, 33K +/-5%, 1/4W	348888	80031	CR251-4-5P33K	2		
R4	RES, DEP. CAR, 150 +/-5%, 1/4W	343442	80031	CR251-4-5P150E	REF		
R5	RES, DEP. CAR, 33K +/-5%, 1/4W	348888	80031	CR251-4-5P33K	REF		
R6	RES, DEP. CAR, 1K +/-5%, 1/4W	343426	80031	CR251-4-5P1K	2		
R7	RES, DEP. CAR, 1K +/-5%, 1/4W	343426	80031	CR251-4-5P1K	REF		
R8	RES, DEP. CAR, 10K +/-5%, 1/4W	348839	80031	CR251-4-5P1K	2		
RN1	RESISTOR NETWORK	407445	89536	407445	3	1	
RN2	RESISTOR NETWORK	407445	89536	407445	REF		
RN3	RESISTOR NETWORK	407445	89536	407445	REF		
RN4	RESISTOR NETWORK	355313	89536	355313	2	1	
RN5	RESISTOR NETWORK	355313	89536	355313	REF		
U1	Ⓟ IC, C-MOS, HEX INVERTER, 14-PIN	404681	02735	CD4069UBE	1	1	
U2	IC, TTL, HEX INVERTER	393058	01295	SN74LS04J	1	1	
U4	Ⓟ IC, C-MOS NAND GATES, QUAD, 2-INPUT	355198	02735	CD4011AE	1	1	
U5	Ⓟ IC, C-MOS, TRI-STATE, NON-INVERT BUFFERS	407759	04713	MC14503CP	4	1	
U6	Ⓟ IC, C-MOS, TRI-STATE, NON-INVERT BUFFERS	407759	04713	MC14503CP	REF		
U7	Ⓟ IC, C-MOS, TRI-STATE, NON-INVERT BUFFERS	407759	04713	MC14503CP	REF		
U8	Ⓟ IC, C-MOS, TRI-STATE, NON-INVERT BUFFERS	407759	04713	MC14503CP	REF		
U9	Ⓟ IC, C-MOS, NAND GATES, TRIPLE 3-INPUT	375147	02735	CD4023AE	1	1	
U10	IC, QUAD, 2-INPUT, POS. NOR BUFFER	393116	01295	SN74LS28N	1	1	
U11	Ⓟ IC, C-MOS, DUAL "D" FLIP-FLOP	418830	12040	74C74	1	1	
U12	Ⓟ IC, C-MOS, DUAL 4-INPUT AND GATE	408799	02735	CD4082BE	1	1	



CAUTION
SUBJECT TO DAMAGE BY STATIC ELECTRICITY

Y5000-1601

Figure 5. A1 Logic PCB Assembly

Table 3. A2 Output PCB Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
A2	OUTPUT ASSEMBLY FIGURE 6 (Y5000-4002T)	491993	89536	491993	REF		
H1	SCREW, PHP, 4-40 X 1/4	129890	73734	19022	4		
J1	RECEPTACLE 36-PIN	478750	02660	57-20360-15	2		
J3	RECEPTACLE 36-PIN	478750	02660	57-20360-15	REF		
MP1	SPRING (NOT SHOWN)	412718	02660	57-1002-02	4		
MP2	LATCH (NOT SHOWN)	412700	02660	57-1001	4		
P9	CABLE (UNDERSIDE OF BOARD)	380576	89536	380576	2		
P10	CABLE (UNDERSIDE OF BOARD)	380576	89536	380576	REF		

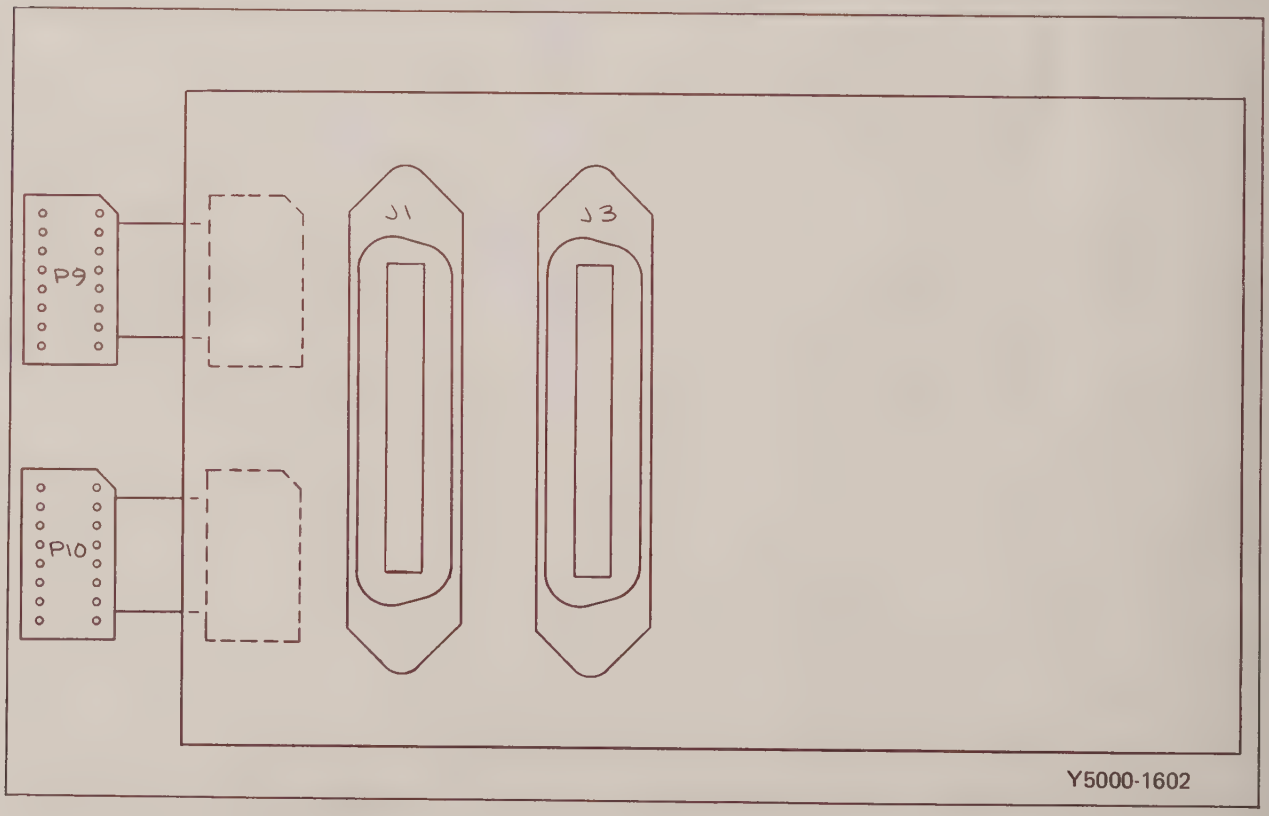


Figure 6. A2 Output PCB Assembly

Table 4. A3 Analog Bus PCB Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
A3	ANALOG BUS ASSEMBLY FIGURE 7 (Y5000-4003T)	492009	89536	492009	REF		
H1	SCREW, PHP, 4-40 X 3/8	152124	73734	19024	2		
H2	SCREW, PHP, 4-40 X 1/4	129890	73734	19022	4		
J2	RECEPTACLE 14-PIN	478743	00779	57-20140-12	2		
J4	RECEPTACLE 14-PIN	478743	00779	57-20140-12	REF		
MP1	SPRING	412718	02660	57-1002-02	4		
MP2	LATCH	412700	02660	57-1001	4		
P2	CONNECTOR, PLUG, 14-PIN (UNDERSIDE OF BOARD)	474247	02660	57-10140-4	1		

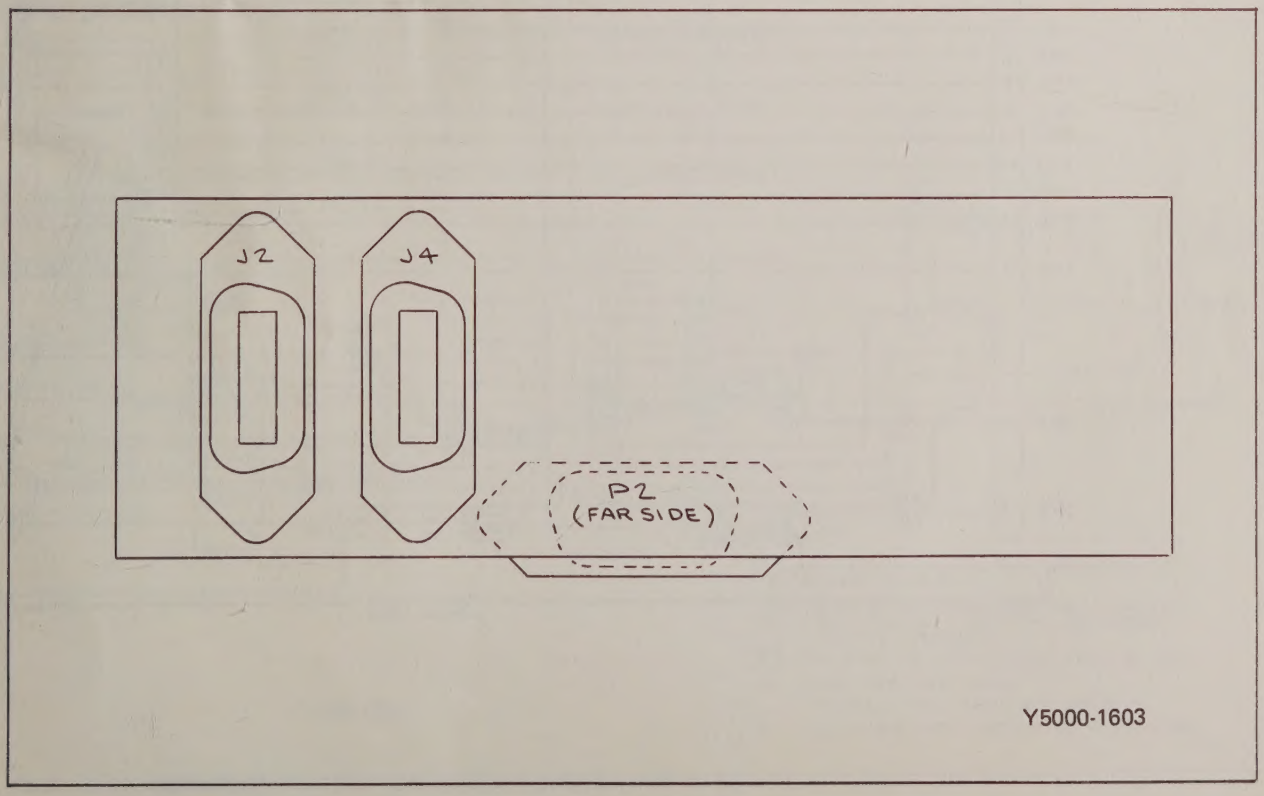
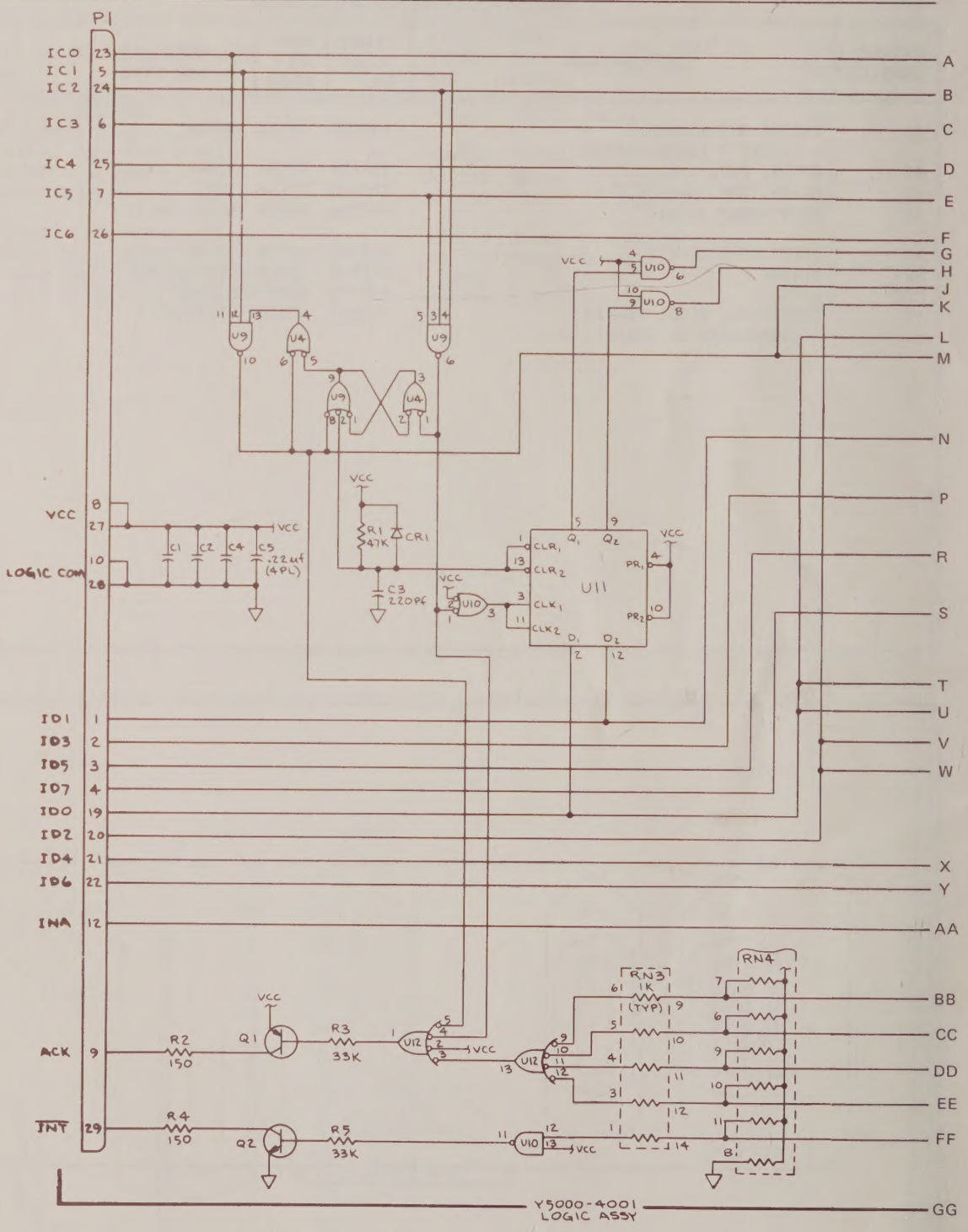


Figure 7. A3 Analog Bus PCB Assembly


P1
IC0 23
IC1 5
IC2 24
IC3 6
IC4 25
IC5 7
IC6 26
VCC 8 27
LOGIC COM 10 28
ID1 1
ID3 2
ID5 3
ID7 4
ID0 19
ID2 20
ID4 21
ID6 22
INA 12
ACK 9
INT 29
A
B
C
D
E
F
G
H
J
K
L
M
N
P
R
S
T
U
V
W
X
Y
AA
BB
CC
DD
EE
FF
GG
U9
U4
U10
U11
U12
C1
C2
C4
C5 .22uf (4PL)
C3 220PF
R1 47K
CR1
R2 150
R3 33K
R4 150
R5 33K
Q1
Q2
RN3 1K (TYP)
RN4
Y5000-4001 LOGIC ASSY

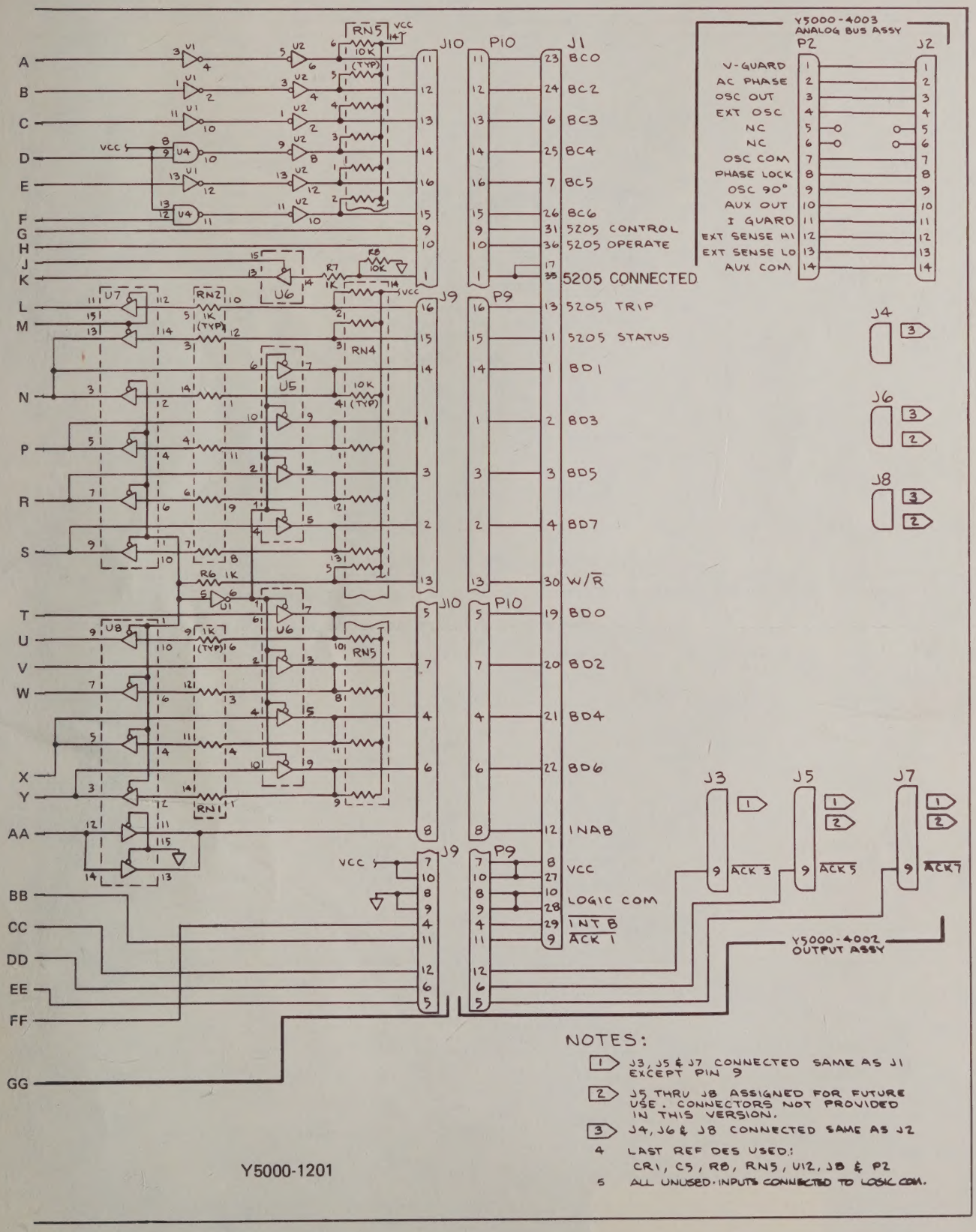


Figure 8. Y500 Interface, 5100 Series

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Tel. (919) 273-1918

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244 Second Ave.
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Canada

ALBERTA
Calgary
Fluke Canadian Technical Center
3829 - 12th St. N.E.
Zip: T2E 6M5
Tel. (403) 276-9658

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Mississauga
Fluke Canadian Technical Center
6503 Northam Drive
Zip: L4V 1J5
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Walter Rekirsch Elektronische
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A-1090 Vienna, Austria
Tel. (222) 347646-0

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Helsinki, Finland
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FRANCE
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Tel. (01) 9563130

GERMAN FEDERAL REPUBLIC
Fluke (Deutschland) GmbH
4-Dusseldorf
Meineckestrasse 53
West Germany
Tel. 211-450831

Fluke (Deutschland) GmbH
8000 Munich 80
Vertriesburo Bayern
Rosenheimer Strasse 139
West Germany
Tel. 089-404061

GREECE
Hellenic Scientific
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NETHERLANDS
C.N. Rood, B.V.
Cort van der Lindenstraat 11-13
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Netherlands
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NORWAY
Morgenstierne & Co. A/A
Konghellgate 3
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Tel. 09-341-6194108

SWEDEN
Teleinstrument AB
P.O. Box 490
S-162 Vallingby-4
Sweden
Tel. (08) 380370

SWITZERLAND
Traco Electronic AG
Jenatschstrasse 1
8002 Zurich, Switzerland
Tel. (01) 2010711

TURKEY
Erkman Electronik Aletler
Necatibey Cad 92/2
Karakoy/Istanbul
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Tel. (0923) 33066

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